DOCUMENT RESUME

ED 467 970 IR 021 490

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TITLE	Student and Supervisor Perspectives in a Computer-Mediated Research Relationship.
PUB DATE	2001-12-00
NOTE	11p.; In: Meeting at the Crossroads. Proceedings of the Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE 2001) (18th, Melbourne, Australia, December 9-12, 2001); see IR 021 433.
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01 Plus Postage. PC Not Available from EDRS
DESCRIPTORS	Case Studies; *Computer Mediated Communication; Computer Uses in Education; *Distance Education; Educational Technology; Foreign Countries; Graduate Study; Higher Education; Information Technology; *Instructional Design; Interaction; Self Efficacy; *Teacher Student Relationship; *Technology Uses in Education; Telecommunications
IDENTIFIERS	Deakin University (Australia); Technology Role

ABSTRACT

This paper presents the reflective perspectives of the student and supervisor in a successful computer-mediated research relationship at Deakin University (Australia). Key contributing factors are discussed in a dialog format covering the role of computer-mediated communication (CMC), the projection of social presence, student self-efficacy beliefs, the role of information and communication technology (ICT), and interaction in online professional networks. Drawing on relevant theory, inherent challenges are addressed, informing some concluding suggestions as to how supervision might become more responsive to the emergent forms of research learning being experienced by escalating numbers of postgraduate students studying at a distance via ICT. (Contains 28 references.) (Author/MES)

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STUDENT AND SUPERVISOR PERSPECTIVES IN A COMPUTER-MEDIATED RESEARCH RELATIONSHIP

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Abstract

This paper presents the reflective perspectives of the student and supervisor in a successful computer-mediated research relationship. Key contributing factors are discussed in a dialogue format covering the role of computer-mediated communication (CMC), the projection of social presence, student self-efficacy beliefs, the role of information and communication technology (ICT), and interaction in online professional networks. Drawing on relevant theory, inherent challenges are addressed, informing some concluding suggestions as to how supervision might become more responsive to the emergent forms of research learning being experienced by escalating numbers of postgraduate students studying at a distance via ICT.

Keywords

computer-mediated communication, ICT, research, supervision, virtual supervision, postgraduate distance learning

Introduction

Predictions for the unlimited future of globalised education through the use of information and telecommunication technologies (ICT) have been widely described and discussed (Hanna, 2000; Evans & Nation, 2000). The capability of students to study electronically with no requirement for physical presence or geographic proximity to their chosen institution has been described as one of the most important capabilities that the Internet has provided and universities are marketing globally to any potential students with Internet access. The ease of use of electronic mail and electronic conferencing software for communication and of resource access via the World Wide Web means that students can complete a degree having never left their home environment or having never met their teachers or fellow students. Postgraduate study particularly has been found suited to a 'virtual' campus with students who are often juggling work and family commitments finding electronic attendance at a university campus much easier and often as satisfying as on campus study (Stacey, 1999). The field of flexible postgraduate research has been studied and reported extensively (Pearson & Ford, 1997; Evans & Pearson, 1999) as the phenomenon of remote supervision of research by electronic means has become more prevalent.

How well does this transformation of teachers and learners with no physical context for establishing relationships work? Is the student 'dislocated' in the process? How can social presence be established? How can a student complete successful research? This paper describes a case study of the pedagogical innovation of computer-mediated research as it uses information and

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communication technology to facilitate the research partnership. It is a description of the process of establishing such a partnership between a student based in Brisbane and a supervisor who was initially in Canada and Europe for the first months of supervision and in Melbourne for completion. The pair had never met, but worked together effectively over two semesters of a research project. The intensity of such a relatively short term research relationship condenses the process experienced in similar student-supervisor relationships which are established at a distance with electronic communication at their centre and presents a more easily analysed experience than the lengthy, often interrupted, doctoral lifespan. The experience will be discussed from the perspectives of each partner in the relationship as a dialogue, beginning with the student perspective and followed by the supervisor's response. Even the writing of the paper has followed the supervisory process as, after several weeks of email discussion, Wendy (student) wrote her perspective with input from Elizabeth (supervisor) about references and previous studies with Elizabeth's commentary added last. In this case with the comments remaining in the final text rather than integrated into a revised thesis.

Context of the Deakin Postgraduate Program

Deakin University is one of Australia's leading distance education providers having been originally established with distance provision as one of its main roles as a dual mode institution (Calvert, 2001). Of the current university enrolment of over 28 000, 13 000 are on campus students, 12 000 off campus (of whom nearly 11 000 are part time) and 3000 are multi-modal students who take some units on campus and some flexibly, usually to fit in with work requirements to support payment of their course. Within Faculty of Education Masters programs, Deakin has one of Australia's highest student enrolments with 797 students currently enrolled. The program is obviously answering a need for the age and stage of life of postgraduate students as all coursework units and supervision is offered in flexible mode with no required campus attendance. For primary course communication students are sent the Deakin Learning Toolkit, a CD-ROM which contains software to enable email, computer conferencing, World Wide Web access and library database search tools as well as a range of software tools suitable for research use such as the bibliographic software, EndNote.

This paper is based upon personal reflective accounts of a recent computer-mediated research experience that comprised the final year long component of the Masters of Professional Education and Training at Deakin University. Deeming the experience to have been functionally and academically successful, we have revisited the practical and qualitative aspects of both the supervision and the process and have identified the following key factors contributing to success from both a student perspective and a supervisor's perspective:

- effective computer-mediated communication including reciprocal projection of social presence by student and supervisor;
- a high self-efficacy belief of the student in the ability to perform in the remote context;
- an ability to utilise appropriate technology to access and integrate resources; and
- motivation to interact in the online professional network.

In also considering the inherent challenges, suggestions are made for ways in which students might be better prepared and supported to succeed within emergent forms of 'online' or 'virtual' supervision.

Wendy: Like the UK Open University research students described by Phillips (1985), the research project titled 'Online Teaching and Learning for the Support and Enhancement of Interior Design Education' was always 'mine' rather than my supervisor's. The project had some initial direction prior to supervision confirmation, creating a need for the supervisor to adapt to this direction. In my university workplace, the study arose from a perceived need to establish the technological literacy levels and affective responses of my own students to ICT, prior to the integration of a web-supported learning system. I also aimed to refine the outcomes of my research into a more widely adoptable student audit approach. My workplace was significant because it served as an informal network, input from which inevitably filtered into the research process and my dialogue with my

supervisor. It also presented me with a vision of the conventional supervision construct as my postgraduate peers worked feverishly to the tune of research schedules and drank coffee in their supervisor's office. This served to reinforce the research supervision experience I was *not* having. My supervisor, Dr Elizabeth Stacey, was located in Melbourne while I was in Brisbane. We had never met, except 'virtually' in the previous semester's unit *Teaching and Learning with Computer Mediated Communication (CMC)* that was conducted using FirstClass computer conferencing and email.

Elizabeth: Wendy's final grade of the highest possible award for her research project helps to explain her as a capable and motivated self-directed learner. She fitted the profile of affective characteristics of a successful distance student compiled by Thompson (1998) that included "autonomy, tolerance for ambiguity and flexibility" (p. 15) as well as a self-directedness and an awareness of her previous performance and competence. This does not mean that she required no supervision but that we early on negotiated the requirements for the research project that Wendy could be relied on to complete, and she responded well to direction and quickly took ownership of her project. It was however, important that we establish a relationship and sense of each other's presence from an early stage of our electronic communication if I was to fulfil the multiple roles of advisor, guide, critic and friend described by Johnston (1999). Fortunately in a previous unit in which I had taught Wendy, I had used strategies in computer conferencing with the coursework group which had established a basis for such online presence (described later). Wendy's workplace support system also reflects an emerging pattern experienced by flexible research students who rely on such a proximal network while they are distant from their university campus (Evans & Pearson, 1999).

Postgraduate Supervision and ICT

Wendy: In examining my experience I recognise that I was one of the escalating number of off campus postgraduate students experiencing an emerging form of research education. It is characterised by the student and supervisor being remote, likely never having met in person, and where the process and experience of undertaking research is entirely enabled and defined by ICT. Tied to this emergent form of research experience is an increasingly diverse postgraduate population that has been recognised by Evans (1998), Frankland (1999) and Pearson and Ford (1997). With a focus on cultural and ethnic diversity, Ryan and Zuber-Skerritt (1999) also highlight the significant numbers of postgraduate students from non-English speaking backgrounds (NESB) now studying with Australian institutions, along with the implications for research supervision.

Elizabeth: As with the scenario Wendy has described above, my experience of supervision relies on ICT and its effective use. I currently supervise 10 doctoral students, five of whom are in other countries. One student is in Hong Kong, one in New Zealand, two in Canada, one in United Arab Emirates and of those within Australia, two are in another state, while even the three residing in Melbourne see me irregularly often preferring to communicate via email or phone. The Masters research students I supervise are also in other states of Australia, with one in Hong Kong, so they too use email or phone for contact. This reflects on the lives of all my students who balance busy work and research lives, and for whom the convenience and time saving of relying on electronic mail for communicating major ideas and reporting progress works well as long as there is the possibility of an occasional telephone call for the purpose of asking questions and making closer personal contact. This type of "electronic" supervision does require my communicating a strong sense of social presence to ensure that I can establish the relationship of trust and ease of communication required of the supervisor-student relationship (Bibby, 1999) that Wendy and I did in fact establish.

Wendy: In parallel, emerging forms of research supervision enabled by ICT are apparent in the notions of a 'virtual campus' described by Stacey (1997) and Walker (1998), and in the actual frameworks currently being set up to facilitate 'online supervision' and support remote research students. One example is the Project for Research-students' Online Supervision (PROS) underway at Middlesex University (Basiel, 2000). A suite of applications is being developed to create a 'virtual supervision environment' (VSE) in which the entire action path from enrolment to final oral presentation will be facilitated. Another re-conceptualisation of research supervision is made

by Zhao (2001), who by identifying the changing nature of both postgraduate students and the society into which they emerge, offers a knowledge management model of research supervision. This model "...requires innovation oriented individuals (research candidates) and a research environment that provides networks of experts and easy access to knowledge technologies for knowledge creation, storage and transfer" (Zhao, 2001, p. 5). This departs greatly from the traditional, enduring and private 'master and apprentice' model lamented by Frankland (1999).

I describe my experience as an example of a *transitional* form of supervision rather than being in alignment with either of the two emergent models above. While the experience was completely enabled by electronic communication, the prescriptive path in the study guide and one-on-one privacy implied that we were to replicate the conventional student-supervisor relationship as best we could. Additionally, the opportunities afforded by ICT for process and student support were not at that point promoted in a structured way; instead we utilised those of best fit in an *ad hoc* manner.

Elizabeth: The idea of a virtual supervision environment is indeed still evolving though as Pearson and Ford's (1997) study of the Australian flexible research environment showed, it is acknowledged as an important new process under construction (p. 103). Evans (1998) described universities becoming larger and more diverse with "part of the enlargement is of a virtual kind as educational spaces become less confined by institutional walls..." (p. 85). The individual focus of the research project makes it harder to provide the online collaborative discussion and support framework between students that is provided in their coursework units but such environments are being attempted (Pearson & Ford, 1997).

Key Factors for Success in 'Online Supervision'

Having identified the key factors above that we believe resulted in both successful research outcomes and supervision, we will discuss each in relation to relevant theory and consider some of the related challenges.

Effective Computer-mediated Communication and the Projection of Social Presence

Social presence, defined by Garrison (1997) as "the degree to which participants are able to project themselves affectively within the medium" (p. 6), has gained importance in research into learning with computer-mediated communication (CMC) as teachers and researchers find that for cognitive presence to be sustained, social presence must be established effectively first. In communication research and theory, social presence has been identified as focusing on the nonverbal and para-linguistic signs of communication, like mimicry and gesture, that are lost with CMC. In the field of communications technology which studies social presence as the degree to which communicating participants are able to project their presence through the technology, social presence can be projected best when the verbal and non-verbal cues and the context can be also be communicated (Rice, 1993). By such criteria, CMC would be judged low on social presence (Lindlif & Shatzer, 1998) and the role of the participants in compensating for lack of cues becomes more important.

Walther (1996), writing from the field of communication research, reflected that early empirical studies into CMC use concluded that participants would be less sociable and more task-oriented, a notion he challenged. However since this early research, field research has shown that with unconstrained interaction time there are high levels of social interaction through email, computer conferencing, etc., which counter the empirical data, though without explaining its results. Walther drew on a social information processing perspective that suggested that communicators in CMC are as driven as any participants to develop social relationships. Given the longer time factor of an ongoing electronic relationship, they are provided with the opportunity for accrual of interpersonal impressions and for the gathering of social information through text messages, so relationships can still develop despite fewer cues. This would explain the theory of impersonality in time-limited CMC group communication research. When tested by Walther and Burgeon (1992) it was found that though interpersonal impressions were formed more slowly with CMC, relationships developed in the same way as in face-to-face situations, even becoming more socially oriented in

the online context. Part of this was explained (and tested by research) as the effect of the anticipation of further future interaction which prompted participants to seek more personal information, act in more friendly ways and cooperate with one another.

Wendy: In the absence of interaction in a face-to-face setting between Elizabeth and I, the communication medium and ensuing dialogue became the tangible substance of the entire research process and documented its developments.

Having completed the first year of the Masters as a truly distant student living in Sweden, and then participating in Elizabeth's CMC unit, I commenced the research phase comfortable with electronic communication. Harasim *et al.* (1995) and our own class group had alerted me to both CMC's potential and perils. I was accustomed to the need for etiquette, dealing with the time lag of asynchronous exchange and operating in the absence of physical and social cues that many new students find disconcerting. Importantly, I had moved beyond the point where mastering the technology was the single most cogent factor. This is a point I will later revisit.

Elizabeth: In the online coursework units, I had developed a strategy for modelling the establishment of social presence. In the first weeks of semester I actively taught the students social practice and use of the software elements that help to establish social presence. Such factors as the use of reply to a message and quoting previous messages within new messages rose in student frequency in response to both my modelled practice and the specific directions I gave. The students responded to my lead and later as the small group process developed, the students became a cohesive and interactive community online.

Wendy: While I may have been accustomed to the lack of physical and social cues, their absence was particularly felt when supervision replaced the more sociable coursework. In communicating one-on-one with Elizabeth instead of with the class group, the need to both project and be receptive to social presence featured strongly. In a seemingly voyeuristic fashion I sought more familiarity with Elizabeth via her web presence, through her reported research and even by re-listening to a Deakin audiotape on which she had been interviewed. There was a definite need to know *who* my supervisor was.

In analysing the texts of our email dialogue over the year-long period, I have identified three typical forms of communication intent:

- practical exchange of information, e.g. a chapter in draft sent as an email attachment or details of a suggested resource from Elizabeth;
- process, e.g. explanation of what underpinned my actions in the attached text or constructive guidance from Elizabeth in the form of a reasoned suggestion; and
- affective/ social, e.g. surrounding commentary indicating how we were feeling about the process, current events and demands which was often humorous or expressed goodwill.

Remote supervision would have been extremely difficult had I felt that the latter form of communication was discouraged or viewed as improper. I admit to taking care not to assume too much familiarity or to seek advice too often or without consideration. Aware that I was one of many other students, I strove for efficiency in my email and actually expended a great deal of effort in ensuring that key questions were asked in advance so that I had responses in time for the periods I had free for research. This was particularly so during the report writing phase.

We spoke by telephone once during the entire project period and despite suggestion that the email dialogue served us well, the extent to which this incident strengthened our familiarity and rapport was compelling. Should Basiel's (2000) virtual supervision environment become viable with its multimedia and multi-channel communication, much of the compensation for absent cues required in CMC would be alleviated. This would then accommodate a greater diversity of communication preferences.

Elizabeth: The pattern of high social interaction accompanying the cognitive engagement of our research partnership mirrors the results of analysis of online interaction of my Masters coursework units. There, even though cognitive content became a main focus of small group learning relationships, high levels of social presence continued to be an important factor. When the groups were interacting in a closed group conference where they could potentially have begun to require fewer social presence factors at a time when they were familiar with one another and focussed on the cognitive content of their shared task, the rate of social presence factors was in fact even higher than when they were establishing their group relationship (Stacey, 2001).

As Walther (1996) proposed, relationships require longer to develop in an electronic medium, and Wendy and I developed a closer social relationship as we reached the most intensive phase of the research project when the written text was passed between us and developed into a final thesis. As we negotiated over content and interacted with one another's message text, asking questions, probing and complimenting the others' suggestions and ideas, the social content of messages continued at a higher level as messages of content and conceptual negotiation would include more personal and social comments. This balance of cognitive and social factors is an important result that contributes to the understanding for establishing an effective long term online relationship that supervisors and students require when communicating at a distance.

Self-efficacy Beliefs for Operating in the Remote Context

Wendy: With its absence of physical environment and organisational symbols, the centrality of communication, and a flexibility almost devoid of structure, remote research and supervision can be likened to remote work in virtual organisations in many respects. Employing Bandura's (1978) self-efficacy theory Staples, Hulland and Higgins (1998) found individual's self-efficacy assessments to be key factors in remote work effectiveness, perceived productivity, job-satisfaction and ability to cope. I identified several parallels with the remote workers above:

- the necessity to schedule both the project components and my available time;
- ensuring that time spent was productive (in order to feel a sense of progression);
- operating without the informal or formal benchmarking provided by peers; and
- judging when it was necessary to seek guidance or feedback.

Drawing from Bandura's work on students' cognitive self-efficacy (1997, pp. 223-31), I believe that survival as a remote research student is dependent upon the ability to function as a self-regulated learner. This encompasses aspiration, motivation, cognitive ability, meta-cognitive skills in monitoring and evaluating the process, and seeking and applying feedback. Quite fortuitously, three previous semesters as a postgraduate distance learner prepared me quite well to operate in this manner. However, my *disciplinary* studies, i.e. adult and flexible teaching and learning, and educational technology, were exactly and atypically aligned with what I was experiencing. I would venture then that students' self-efficacy beliefs in their ability to operate effectively in the remote context are highly contingent upon their prior experience and preparation, suggesting that institutional/ departmental expectations of students should be made explicit. Once enrolled, there could also be opportunities for reinforcing students' self-efficacy beliefs through structuring the initial research proposal, planning and communication in such a way that a range of requisite self-directed tasks and meta-cognitive self-evaluation is accomplished up front.

Elizabeth: Wendy's reflections concur with the findings of research into successful distance students in higher education (Campbell Gibson, 1998). Her suggested strategies for developing self-direction and self-efficacy are sound and timely. In the earlier structuring of the FirstClass online conferences, a discussion space was established for students completing research projects, but as with the conferences established for PhD students, the disparity of topics and methodologies between students meant that students worked on an individual basis and there was little shared discussion. However in a professional doctorate conference with structured, required research tasks there is an active research discussion, so consideration needs to be given to distance students developing an online community discussion through defined tasks of the kind Wendy suggests.

Utilisation (and Exploitation) of Appropriate Technology

Wendy: As mentioned earlier, I entered the research phase at a point where the associated technology had become gloriously salient. It was possible to move seamlessly between email, discussion fora, web-based resources and database interfaces, and benefit from the online support at both Deakin and my own institution. Exceedingly valuable too, was the informal technical support I had at home to remedy any technical crises. I recognise that this represents a 'best case' scenario and could be assumed for only a small number of remote research students. Referring back to the self-regulated learner, a component of this is the ability to seek, apply and learn from technical assistance, but the fact that this might rely on email or long distance telephone calls is an obvious hurdle.

Writing specifically on the supervision of NESB students, Ellis and Phelps (1999) identify some key technology utilisation issues that apply to all research students. The first is the student's practical ability to use the hardware and software that assist in locating resources; organising, managing and analysing data; and preparing drafts, reports or the thesis document. Again, students will possess very diverse abilities in these areas, and I developed several such skills during the research period. In the face of the vast information sources now accessible via the web and 'deep web' databases, the second major issue is students' ability to critically approach information quality, extending to the evaluation and synthesis of information. Immersed in the teaching and learning discipline, I was already cognisant of critical literacy, and used guiding principles from the theory. The supervisor's role was really important here in indicating whether my knowledge of the literature was widely representative and authoritative, or if I had been going up the 'cyber garden path'.

Elizabeth: As described in the introduction, Deakin University has developed key strategies for a yearly provision of software and multimedia guidance for research students through the Deakin Learning Toolkit CD-ROM and a strongly supportive library service that has developed extensive online portals to online resources. However, it is the guidance of the supervisor in using these capabilities and providing direction for the most effective use of Internet resources that changes and transforms the distance research relationship through the use of ICT tools. Feedback and critical direction is an important role in supervision but more so with the electronic nature of literature searching as it has developed today.

Interaction in the Online Professional Network

Wendy: Stacey (1997), Walker (1998) and Basiel (2000) have integrated or plan to integrate online peer and/or expert interaction within the research supervision process. I regard such interaction as essential in the potentially isolated remote context. Due to having a fairly unique topic at the time, I did not participate in a formal online conference, but instead informally maintained or developed a variety of professional contacts via email or discussion lists, sometimes being 'introduced' by Elizabeth. An individual's web presence was often useful in providing peripheral cues about the person and their context. This informal interaction fertilised the research process and assisted in mediating some of my beliefs and misconceptions.

I experienced a phenomenon in the online professional network that I believe to be extremely valuable to all research students, but particularly those who experience little face-to-face professional interaction, and that is the tendency of the medium to dismantle hierarchy. It is highly compelling to read an expert's journal article, for example, then make a related inquiry via email and receive a timely response! I also feel that a distinct lack of hierarchy was evident in my relationship with Elizabeth. She has alerted me to the fact that just about everybody, irrespective of experience or academic calibre, has something to offer another. The online medium and its role in professional discourse should be promoted as a valuable and current resource.

Elizabeth: The dismantling of hierarchy is a phenomenon tracked in the literature about postgraduate supervision (Johnston, 1999) and often attributed to study in the non-scientific disciplines where ideas are negotiated more collegially. However the advent of online supervision has hastened this democratising of the relationship when differing power or status cannot be easily perceived in electronic communication. In the supervisor-student relationship, the importance of establishing a trusting social interaction pattern online requires any such hierarchy to be dismantled as soon as possible and Wendy and I developed an easy communication pattern by both of us messaging informally but purposefully from the early stages of our online partnership.

Concluding Thoughts

Reflecting further on the key factors to succeeding in remote, computer-mediated research identified above, it is evident that the student's experience embodies not only the actual research project and reporting, but also a necessity to interact with a complex range of information and communication technologies, electronic resources and networked individuals in the shape of the supervisor/s, peers and experts. Preparation for this task must be developed systematically with the students directed to university facilities provided for online support. Public conferences in FirstClass which give access to IT support, library personnel and distance education support staff have provided an important virtual campus environment for distance students and postgraduate student organisations have developed online discussions to provide information and support for research students.

Wendy concluded that the institution imposed research preparation is both outdated and inadequate for students remote from their campus as she was. The experience of postgraduate research has practically and qualitatively changed for off-campus students who rely to such a large extent on ICT to provide the support system of the campus. Student preparation in the form of research methodology studies is only one component of the full, complementary set of technical and critical abilities that are demanded. Establishing a strong relationship with one's supervisor online with an expectation of regular electronic communication is an essential step to a successful research project. This should be supplemented by a pre-requisite preparation and induction process that precedes the research project stage. Addressing the key areas discussed would result in explicit student accomplishments that would then be systematically applied and further developed.

Further research to inform a responsive educational design for computer-mediated research is timely. Our research partnership was successful despite a lack of the prerequisite research skills training required because we were able to provide these through our computer-mediated partnership and through Wendy's discipline and university context. The computer-mediated communication supported the research process because of the way we defined the use of electronic communication and because of our strategies to focus on developing social presence in our online environment. Our strategies need to be defined and developed as a process to support other students who are attempting to learn to research at a distance via ICT.

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